Theme X – Additional sessions

Coordinators
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Session X-1: Young Scientists Travel Award Short Presentations

Co-chairs
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Session X-1: Oral presentations

X-1-152 *

Emulating the human vasculature in a multi-organ-chip platform

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Our multi-organ-chip (MOC) platform contributes to the ongoing development of *in vitro* substance testing systems with the ultimate aim to replace animal models. It comprises two independent circulatory networks at the scale of a microscope glass slide. Onchip micro-pumps provide pulsatile circulation – enough to support microliter amounts of human tissue constructs in defined cultivation cavities. Each circuit contains 600 μl of volume, only, enabling autocrine and paracrine crosstalk through the enriched medium.

In a subsystemic testing structure, like our MOC, artificial vessels are vitally important. In particular an endothelial barrier within the chip potentially interacts with medium constituents and regulates their diffusion into subjacent tissue. Recreating *in vivo* conditions, first, the flow behaviour was analysed and optimised using particle image velocimetry (PIV). Upon seeding into the channel-structures human dermal microvascular endothelial cells (HDMECs) exhibit proper elongation and orientation within four days induced by the flow shear stress. The cells were dynamically cultivated for up to 40 days. Data of the colonisation and the viability of the endothelial cell layer will be presented as well as functional staining of CD31, von Willebrand factor, and VE-cadherin. Further developments to facilitate a real perfusion of introduced organoids (e.g., liver) will be addressed.

* *Supported by Young Scientists Travel Awards provided by ACT Germany and the German Foundation SET.*

X-1-186 *

A 3D culture system for investigating inflammatory responses in human lung

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Respiratory inflammatory diseases are amongst major causes of morbidity and mortality worldwide. Lung fibroblasts have been shown to play a key role in local immune responses during inflammation. However, the role of molecular pathways such as nuclear factor kappa B (NF-κB) activation in human have remained elusive partly due to the limited physiological relevance of animal models and lack of biomimetic *in vitro* models. We have developed a 3D culture of lung fibroblasts on porous electrospun fibres resembling human lung matrix. In order to investigate NF-κB activation in response to pro-inflammatory stimuli, we developed two detection systems based on nuclear localisation of p65 subunit and release of a soluble luciferase reporter construct. Using these systems, we can detect NF-κB activation in response to TNF-α in dose dependent manner with high sensitivity. Interestingly the 3D model remained responsive to TNF-α at higher concentration (20 ng/ml) whereas 2D culture controls reached a plateau at 10 fold lower concentration. The dynamic range of responses in 3D cultures reflects a more *in vivo* like physiologic receptor expression and cytokine profile. We therefore believe our 3D culture detection system provides a sensitive and biologically relevant tool for studying the regulation of NF-κB activation in lung fibroblasts.

* *Supported by Young Scientists Travel Awards provided by ACT Germany and the German Foundation SET.*

X-1-250 *

In vitro skin corrosion as a prevalidation study of Reconstructed Human Epidermis in house developed

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Currently there is a strong global trend towards the development of *in vitro* tests to replace the use of animals in safety evaluation tests. In Brazil, this practice is in progress and should be quickly implemented meeting the international humanitarian concepts. In the present study we developed a model of Reconstructed Human Epidermis (RHE), which consists of a differentiated three-dimensional epidermal tissue reconstructed from normal human keratinocytes in a chemically de-

fined medium and air liquid interface growth. To validate the model, it was tested for skin corrosion, following the principles of the Guide 431 (Organisation for Economic Cooperation and Development – OECD). Four substances from the list indicated in the Guide 431 were tested, two corrosive references (Lactic Acid and Octanoic Acid) and two non corrosive references (Benzylacetone and Lauric Acid), as well as positive and negative controls. The results show that three of four substances (Lauric Acid, Lactic Acid and Octanoic Acid) and the controls could be classified in the expected categories of the Guide 431. Therefore, we demonstrated the potential of our RHE model as a test method relevant and reliable and may be used for research and chemical risk assessment.

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X-1-276 *

Biotransformation of testosterone and 2,4-toluenediamine by human skin and reconstructed tissues

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Reconstructed human skin (RHS) gains increasing interest in preclinical drug development, but as with human skin, knowledge about biotransformation capacity is rather poor although this can be highly relevant for genotoxicity and sensitization testing. We compared the metabolism of the standard compound testosterone and the industrial chemical 2,4-toluenediamine (2,4-TDA) in excised human skin, RHS (PhenionFT, EpidermFT) and undifferentiated keratinocytes and fibroblasts.

Biotransformation of radiolabeled testosterone was determined by HPLC coupled to a radiodetector and 2,4-TDA and its metabolites were quantified by HPLC-UV.

Testosterone and 2,4-TDA metabolism by RHS exceeded biotransformation in human skin, yet, the metabolite profile was close. The mono-N-acetylated derivative N-(3-Amino-4-methylphenyl)acetamide was the only metabolite of 2,4-TDA found in all test matrices and the formation ranked as: RHS > human skin ~ keratinocytes > fibroblasts.

Metabolism of testosterone and 2,4-TDA in human skin tissues is dominated by phase I and phase II reactions, respectively. Reconstructed tissues appear to be an adequate test matrix for the investigation of cutaneous metabolism of xenobiotics and thus can be used for non-clinical drug development as well as the investigation of biotransformation-related toxicological endpoints.

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X-1-434 *

In vitro models for neuroimmunological diseases

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Activation of the immune system is a common hallmark of neurodegenerative diseases as Multiple Sclerosis and Alzheimer's disease. This involves responses generated by the innate immune system within the central nervous system (CNS) and cross-talk of the CNS with cells of the peripheral adaptive immune system.

Various non-human primate (NHP) *in vivo* models are available to study neuroimmunological involvement in the pathogenesis of neurodegenerative diseases. However, these models are associated with considerable discomfort to the animals. We aim to complement these models and to finally reduce and replace their use by *in vitro* models. We have developed various NHP *in vitro* models including organotypic brain slice cultures, mixed glia cell cultures, dissociated primary glia cell cultures, and co-cultures of glia cells with cells of the adaptive immune system. These cultures are all initiated from surplus brain tissue that becomes available from other experiments.

The advantages and disadvantages of NHP *in vitro* CNSmodels compared to other available *in vitro* models will be discussed as well as their relevance for human diseases. Furthermore, data will be presented on the use of these models as prescreening tool for *in vivo* drug testing and to mimic different aspects of neurodegenerative diseases *in vitro*.

* *Supported by Young Scientists Travel Awards provided by ACT Germany and the German Foundation SET.*

X-1-445 *

Human *in vitro* adipogenesis assay for testing modulators of adipogenesis

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According to WHO, 1.6 billion adults are overweight, and at least 400 million obese, and numbers are increasing annually. Therefore, there is a lot of interest to study effects of chemicals on adipose tissue and to develop drugs that inhibit adipogenesis. However, animal models currently used to mimic human adipose tissue metabolism correlate poorly with human.

We have developed a novel human *in vitro* adipogenesis assay for testing the effects of chemicals on adipogenesis. Our model consists of human adipose stem cells (hASC) which are differentiated with adipose tissue extract (ATE) (Sarkanen et al., 2012). ATE is cytokine rich solution which contains the major adipocytokines and induces differentiation of hASC towards adipocytes.

The performance of the assay was tested with substances that effect adipogenesis. Evodiamine, 4-hydroxy-tempo, Bromelain, sodium-meta-arsenite, resveratrol, GW9662 and T0070907 showed strong dose-dependent adipogenesis inhibition in the assay. The anti-adipo-

genic effect of 3-azido-3-deoxythymidine, saquinavir mesylate and 2,4,5-trimethoxybenzaldehyde was mild. Bimatoprost did not show inhibition in the concentration range tested. The developed *in vitro* adipogenesis assay is useful for mimicking human adipogenesis and studying the effects of different compounds on adipogenesis. In the future assay will be further optimized and intra-laboratory validated (Sarkanen et al., 2011).

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X-1-472 *

Simulating the first phase of bone fracture healing *in vitro* – Possible or not?

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The first phase of bone fracture healing is characterized by hypoxia and inflammation being susceptible for interfering effects of medications and environmental conditions leading to delayed or non-unions. However, to study the underlying mechanisms, mainly osteotomy models in rodents are enrolled (Histing et al., 2011). The insertion of fracture gaps is accompanied by stress and strain for the animals whereas the interpolation of results to human is challenging. Hence, we are developing a 3D-scaffold-free fracture model including a fracture gap filled with a simulated fracture hematoma. Therefore, we use primary human cells such as mesenchymal stem cells and clotted blood cells. To create a suitable *in vitro* fracture hematoma model, we studied intensively the naturally occurring hematoma in human patients and investigated them *in vitro* under restricted nutrient and oxygen conditions (Hoff et al., 2013). The fracture gap consists of two 3D-bone-constructs based on the scaffold-free 3D-cartilage-technology. To proof the applicability of our model, we will test a therapeutic approach that was previously analyzed to be successful for the promotion of bone healing in a mouse osteotomy model and is based on the stabilization of the hypoxia-inducible-factor. Here, we will present promising data underlining the advanced suitability of the new model as alternative for animal testing.

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X-1-723 *

Validation of a mock circulation loop for the development of ventricular assist devices with physiological data

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Cardiovascular devices, such as ventricular assist devices and artificial hearts, are a promising solution to address the burden of cardiovascular disease. These devices require extensive animal testing prior to clinical implementation. Mock circulation loops (MCL) are mechanical representations of the human circulatory system and are used to optimize cardiovascular devices prior to animal experimentation. This study aimed to use human data to simulate common patient scenarios in a MCL for improved *in vitro* cardiovascular device evaluation.

Haemodynamic parameters were measured continuously via non-invasive impedance cardiography in healthy subjects completing a Valsalva manoeuvre, during postural changes and in transitions from rest to exercise. This data was used to simulate and validate common patient states and transitions between states in the MCL.

The haemodynamic parameters obtained from humans during changes in patient state were successfully implemented in the MCL. This resulted in an accurate system capable of replicating common patient conditions and, therefore, an improved system for *in vitro* evaluation of cardiovascular devices.

The combination of human haemodynamic data and a MCL resulted in an accurate cardiovascular device evaluation system. This system promotes earlier optimisation of devices and a reduction in the number of animal trials required for device validation.

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X-1-834 *

A human iPSC-derived 3D model for the assessment of gene/environment interactions during neurodevelopment

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Concerns about developmental neurotoxicity (DNT) have increased recently due to the evidences that exposure to different chemicals may contribute to neurodevelopmental disorders. Developmental neurotoxicity assessment of drugs and chemicals are costly ($1.4 million per substance) and consumes a large number of animals (mainly rats). These experiments impose medium to very severe stress on animals. Our aim is to develop a human-relevant, high quality *in vitro* 3D model applicable to micro-physiological systems to test chemicals/

genetic factors which affect neurodevelopment. Furthermore, combining human induced pluripotent stem cells (iPSC) from diverse genetic backgrounds (donors) makes it possible to incorporate idiosyncrasies such as genetic polymorphisms into *in vitro* toxicity assays. Within this work, healthy and Down's syndrome 3D models kept in culture for up to eight weeks, have been characterized by immunostaining and gene expression showing neural precursor cells (nestin), mature neurons (neurofilament, β-Tubulin III, Map2), synaptogenesis (synapsin) and astrocytes (GFAP, S100β). Here we present the applications of this emerging alternative technology and identify possible future directions of our developed *in vitro* 3D brain microphysiological system from iPSC.

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X-1-926 *

Use of reconstructed human epidermis as alternative models for efficiency studies against the penetration of organophosphates

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Topical skin protectants (TSPs) have been developed as complementary protections against the penetration of toxic chemicals as organophosphates (OPs, cholinesterase inhibitors). Their efficiency is measured by their abilities to prevent OPs penetration. The most used model is pig skin due to its relevance to human skin (Barbero and Frasch, 2009). Alternative models such as reconstructed human epidermis (REp) or artificial membranes (AM) have been developed, their permeability usually much higher than human skin (Schäfer-Korting et al., 2008; Millerioux et al., 2009). This study (1) assesses REp and AM permeability to OPs and (2) determines whether these models could be used to evaluate TSPs efficiency. Firstly, we study paraoxon penetration (model OP agent[3]) through REp (SkinEthic RHE® 4 cm^2 and EpiSkin 1.07 cm^2) in their inserts and AM mounted in Franz diffusion cells (1.13 cm^2). Paraoxon permeability could be ranked as following: AM > SkinEthic > EpiSkin as found in literature for similar lipophilic molecules (Schäfer-Korting et al., 2008; Schmook et al., 2001). SkinEthic and EpiSkin appeared to respectively slightly overestimate and underestimate paraoxon penetration in comparison to *in vitro* pig and human skin (Millerioux et al., 2009; Vallet et al., 2008). Secondly, we propose to study their abilities to evaluate TSPs efficiency. Different spreading methods were studied to determine which provide a homogenous deposit on skin surface (profilometry/optical microscopy). Correlation between deposit quality and efficiency of known TSP will be discussed.

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Session X-2: Cosmetics around the world

Co-chairs

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Session X-2: Oral presentations

X-2-679

Ending cosmetics animal testing in the EU and beyond

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The campaign to end animal testing for cosmetics gained strength in the late 1970s. In Europe leaflets demanding an end to the Draize eye test and naming companies that test on animals were distributed to shoppers, and newspaper stories inspired the "cruelty-free" movement. The momentum was unstoppable; by 1991, when the sixth amendment to the cosmetics directive was proposed, consumers and politicians wanted action. The dossier was taken up by German MEP Dagmar Roth-Behrendt, and in1993 the first EU deadline was set, banning the sale of animal-tested cosmetics from 1st January1998. The ban was finally achieved on 11th March 2013, and further international regulatory changes followed. Now, in 2014, consumers worldwide are seeking change, and their voices are being heard in countries where animal protection is an emerging political concern. While the cosmetics market has expanded, compassion for animals has also grown and this is driving new partnerships, fostering regulatory and scientific advances. Humane Society International is proud to be working with scientists, regulators and companies to create a future in which animals no longer suffer to create new beauty products; we welcome the contribution made by the EU ban to the wider objective of promoting humane science.

X-2-690

Commitment of Government of India to make available only cruelty free cosmetics

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The Constitution of India provides that it is the fundamental duty to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures. Keeping this in view and the development of non-animal testing methods for testing safety of cosmetics, the Central Drug Standards Control Organization, in the Government of India took a landmark decision to prohibit animal testing for cosmetic ingredients, formulations and finished products in the country. Apart from this it is also in the process of making suitable legislation for stopping the import of cosmetic into India which has been animal tested in other parts of the world. India would be thus first BRICS nation where cruelty free cosmetics would only be available. In doing so, India will maintain its commitment to safeguard our consumers, and continues to support to domestic cosmetics market worth $950 million per year, and growing at 15-20% p.a. After making India cruelty free cosmetics marketplace, CDSCO would take the next commitment of minimizing the use of animals in testing of drugs, vaccines and medical devices. To this end, CDSCO has declared 2014 to be an "animal safety" year, in addition to being a human safety one.

X-2-698

Advancing legislation and policy in the United States to end animal use in cosmetics safety testing

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In 2014, for the first time, the United States Congress introduced federal legislation to end the use of animals for safety substantiation testing for cosmetics manufactured or sold in the country. Representing a significant portion of the overall world market, passage of such legislation would positively impact decisions being made in emerging markets and make it easier for existing markets to end animal testing.

This presentation seeks to provide an historical analysis of regulatory, corporate and other stakeholder's work to promote the development and validation of modern testing alternatives with other industry leaders and federal regulators. It will provide rationale for federal legislation versus an administrative petition or other regulatory route. And, it will analyze why the United Sates has lagged behind other world markets in officially ending the use of animals in cosmetics safety testing. Finally, the presentation will articulate a pathway forward, including the current challenges, for passing federal legislation in the United States.

X-2-720

Cosmetics animal testing in Australia: are normative standards adequate?

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Australia occupies a unique position on the global stage in relation to cosmetics animal testing, in that it is widely claimed by industry that no animal testing currently occurs. This absence of animal testing is, however, not enforced through any prohibitory legislation, but is a normative standard set by the Australian cosmetics manufacturing industry.

On March 18th 2014, the *End Cruel Cosmetics Bill 2014* was introduced into Australian Parliament. If passed, the Bill would formally ban cosmetics animal testing in Australia, as well as the import and sale of cosmetics newly animal-tested abroad.

The introduction of the Bill reflects public opinion: an overwhelming majority of Australians oppose using animals in the development of cosmetics, with 81% of Australians supporting a national ban on the sale of animal-tested cosmetics (Nexus Research, 2013).

To ensure the Australian cosmetics industry's claimed standards are enshrined in law, a formal ban must be put in place to avoid the potential for Australia to become a future "dumping ground" for animal tests. The banning of the import and sale of cosmetics newly animal-tested abroad would also strengthen the global movement away from animal testing for cosmetics, and place Australia at the forefront of change.

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X-2-732

Ban of animal use in cosmetic products safety assessment: Brazilian Scenario

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The use of animals for teaching and research in Brazil follows the Law 11,794/2008 and the directives of the National Council to Control Animal Experimentation – Concea. Concea is the competent governmental institution to monitor and evaluate the introduction of alternative methods that replace the use of animals in teaching and research according to the 3R's principles. Recently (May 2014), a Concea resolution determined the acceptance of validated alternative methods and established a period of five years for the substitution of animal tests considering the purpose and the test guidelines on alternative methods to animal use adopted by OECD. Concerning the cosmetic sector, Brazilian regulatory agency (Anvisa) accepts Alternative Methods, as reported in the Guide for safety assessment of cosmetic products[1]. Some projects of Law are under discussion in the Brazilian Congress and State Legislative Chambers aiming the ban of animal use for cos-

[1] http://portal.anvisa.gov.br/wps/wcm/connect/92f15c004e219a73a96dbbc09d49251b/Guia_cosmeticos_grafica_final.pdf?MOD=AJPERES (accessed April, 2014, in Portuguese).

metic safety assessment. The Ministry of Science, Technology, and Innovation created in 2012 the National Network of Alternative Methods (Renama[2]) aiming the implementation and validation of alternative methods, and development of laboratorial competence. The initial strategy focuses in the adoption of OECD guidelines, good laboratory practice (GLP), inter laboratory comparisons and training.

[2] http://www.renama.org.br

X-2-756

Introduction to the evolution in global cosmetics regulation

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The European Union's cosmetic animal testing and sales bans have set a world-wide precedent for cruelty-free personal care products. The regulation has created an opening to inform and engage the public and policymakers on issues surrounding alternatives to animal testing in emerging economies, or countries where animal testing has not been a topic of substantial public policy focus. Additionally, the bans have sparked significant investment in alternatives research within the EU as well as in countries such as South Korea which recently committed to investing US$145 million in developing its first Centre for Alternatives to Animal Testing.

This presentation will provide an introductory look at Humane Society International's *Be Cruelty-Free* campaign – the largest campaign in the world working to extend the European precedent – and its leading role in advancing subsequent bans in India, regulatory proposals in Brazil, Australia, New Zealand and beyond, and China's upcoming removal of its mandatory animal test requirements for domestically manufactured cosmetic products. The presentation will establish a basis of knowledge for further presentations in this workshop that will provide a variety of regional governmental, industry, and NGO stakeholder perspectives on the growing movement to end cosmetics animal testing worldwide.

X-2-770

On cosmetics animal testing and be cruelty free campaign in China

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China requires pre-market animal testing and does post market testing of cosmetics. The new regulation valid from June 30, 2014 removes the mandatory request of animal testing and allows domestic manufacturers to use alternative testing data in the pre-market registration.

Chinese scientists began the study of alternatives in 1997 but the development was quite slow. Only one alternative testing, 3T3 neutral red uptake to test phototoxicity, was validated in early 2012. The 12th National Five-year Plan included a brand new plan for the construction of cosmetics toxical alternative testing system, which aimed to validate another ten alternatives as well as the establishment of a domestic alternative validation center.

Be Cruelty Free China is working with the government regulatory agencies on the policy reform, the scientists on the promotion of alternative study and validation, and, the animal activists to educate the public and gain their support for the ban of cosmetic animal testing in China.

X-2-772

South Korea's evolving cosmetics regulations and investment in animal testing alternatives

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The cosmetics regulatory framework in South Korea establishes different requirements "ordinary" products such as shampoos and lipstick versus "functional" products such as sunscreens, anti-wrinkle and skin-whitening creams. Ordinary cosmetics are not subject to animal testing requirements for domestic sales, and the Ministry of Food and Drug Safety (MFDS) has announced that it will accept data from validated non-animal tests for the safety substantiation of functional cosmetics. According to the MFDS, only two new functional cosmetic ingredients have been registered in Korea in the past three years, and no notifications have been received for new ingredients for ordinary products. This suggests that there is little chemistry-based innovation, or animal testing, taking place in the Korean cosmetics market. In parallel, South Korea has dramatically enhanced its investment in *in vitro* testing capacity, ring-fencing 166 billion in national currency (~US$160 million) to establish Korea's first national centre of excellence for the development and validation of alternatives to animal testing. These conditions favour policy alignment with the growing number of countries that have prohibited animal testing for cosmetics, or are moving to do so, in the interests of unobstructed trade and responsiveness to public opinion and consumer demand for cruelty-free.

Session X-2: Poster presentation

X-2-758

The LUSH non-animal testing policy

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Lush Cosmetics started 18 years ago with a founding principle that none of our finished products would be tested on animals and that we would not purchase from any ingredients suppliers that tested on animals. We believe animal models do not help us evaluate our products and that animal testing is cruel and unethical. For those 18 years, we have had to invent and bring products to market without any involvement with animal testing; despite this "hurdle", we have a vibrant

range of products which make our shops interesting and keep customers coming back for more. Along the years we have wondered why, if we can do this, are other companies are not taking the same stance. Our conclusions have been that legislation is needed to push companies to change their long engrained working practices and that science needs to be encouraged and rewarded for making the leaps forward needed to aid industry to remove animals from toxicity testing. For these reasons, Lush campaigns worldwide for governments to tighten animal testing legislation and two years ago we launched the Lush Prize – a quarter million pound annual award that recognises good animal-free methodologies and rewards the scientists developing them.

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Session X-3: Special lectures

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Session X-3: Oral presentations

X-3-572

BEMF award lecture 2014: Better science with human cell-based organ and tissue models

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The pioneer work of Dr Björn Ekwall in the field of *in vitro* toxicology indicated that cell cultures could be used to mimic toxic effects of chemicals in man. He formulated (1983) the "basal cytotoxicity concept" which is in good agreement with the present global vision in which the toxicity testing should be based on assessing the effects on key molecular events in critical cellular pathways (Adverse Outcome Pathways) tested with human cell-based tissue/organ models.

Today, we know that animal experiments may, in many cases, produce results with no or only limited relevance to man. The prediction ability of animal toxicity tests has shown to be around 50% (Basketter et al., 2012; Knight, 2007) or even around 20% (van Meer et al., 2012). Arecent large retrospective study showed that results from humanized mouse disease models may not be relevant to man at all (Junhee et al., 2013). These are the main reasons for the poor probability of success of drug development accounting only 8% today (Arrowsmith and miller, 2013). Therefore, one may also conclude that basic and mechanistic research performed with animals or animal cells has poor applicability to the human situation. In this presentation, some recent developments of alternative methods, testing strategies, and their challenges are highlighted.

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X-3-640

A history of the 3Rs in toxicity testing: From Russell and Burch to 21st century toxicology

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The 3Rs – replace, reduce, refine – have become the internationally accepted framework guiding the development of alternatives to animal experimentation. In this presentation, we examine the history of the 3Rs in toxicology, the field in which this approach has arguably had the biggest impact (Stephens and Mak, 2014). Two developments help to frame our analysis, which concentrates largely on replacement. The first was the 1959 publication of Russell and Burch's *Principles of Humane Experimental Technique*, which proposed the 3Rs framework. The second was the 2007 publication of the National Research Council report on *Toxicity Testing in the 21st Century*, following which prominent scientists began predicting the near elimination of animal use in toxicity testing through the development of "21st Century Toxicology." We present the results of comprehensive citation and literature searches that track the influence of the 3Rs framework and the prevalence of 3Rs-related research in toxicology over time. We also draw on timelines of various 3Rs activities. We gauge the impact of more than 50 years of 3Rs activity by focusing on the validation and regulatory acceptance of alternative methods and trends in animal use statistics (Stephens, 2010; Stephens et al., 2001). We conclude with a discussion of remaining challenges to the evolution of alternative methods.

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Session X-3: Poster presentation

X-3-175

Björn Ekwall memorial foundation

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Björn Ekwall Memorial Foundation (BEMF, http://www.bemf.eu) was established 2001 by the Scandinavian Society for Cell Toxicology (SSCT) for the memory of Dr Björn Ekwall (1940-2000), an outstanding Swedish cell toxicologist and founder of SSCT. Dr Ekwall was a pioneer in the field of *in vitro* toxicology. Already in the 1970s he performed extensive studies showing that cell cultures could be used to evaluate the toxic effects of chemicals. In 1983 Dr Ekwall formulated "the basal cytotoxicity concept", and some years later initiated an international project "Multicenter Evaluation of *in Vitro* Cytotoxicity" (MEIC, 1989-2000) with the aim of evaluating *in vitro* tests for the prediction of human acute systemic toxicity.

The main goal of the BEMF is to honour the memory of Björn Ekwall by rewarding scientists who have substantially contributed to the field of *in vitro* toxicology. During the past 13 years the Björn Ekwall Memorial Award has been given every year in connection with relevant scientific meetings. So far, 13 scientists have received the Award, among them excellent *in vitro* toxicologists from England, Finland, Germany, Spain, Sweden, and USA.